**Chapter 9 Section 2: Plate Tectonics**

**Key Concepts**

* [What is the theory of plate tectonics?](javascript:openCrossRef('../ch9/ch9_s2_1.html%23lnk254.2'))
* [What are lithospheric plates?](javascript:openCrossRef('../ch9/ch9_s2_1.html%23lnk254.3'))
* [What are the three types of plate boundaries?](javascript:openCrossRef('../ch9/ch9_s2_2.html%23lnk255.2'))

**Vocabulary**

* [convergent boundary](javascript:openCrossRef('../ch9/ch9_s2_2.html%23lnk255.4'))
* [transform fault boundary](javascript:openCrossRef('../ch9/ch9_s2_2.html%23lnk255.5'))
* [plate tectonics](javascript:openCrossRef('../ch9/ch9_s2_1.html%23lnk254.2'))
* [plate](javascript:openCrossRef('../ch9/ch9_s2_1.html%23lnk254.2'))
* [divergent boundary](javascript:openCrossRef('../ch9/ch9_s2_2.html%23lnk255.3'))

**Earth’s Major Plates**

**According to the** [**plate tectonics**](javascript:openGlossaryWnd('e_ga_06_pltetctonics')) **theory, the uppermost mantle, along with the overlying crust, behaves as a strong, rigid layer. This layer is known as the lithosphere.** The outer shell lies over a weaker region in the mantle known as the asthenosphere. The lithosphere is divided into segments called [**plates**](javascript:openGlossaryWnd('e_ga_06_plate')), which move and continually change shape and size. Figure 8 on pages 256–257 shows the seven major plates. The largest is the Pacific plate, covering most of the Pacific Ocean. Notice that several of the large plates include an entire continent plus a large area of the seafloor. This is a major departure from Wegener’s continental drift hypothesis, which proposed that the continents moved through the ocean floor, not with it. Note also that none of the plates is defined entirely by the margins of a continent.

The lithospheric plates move relative to each other at a very slow but continuous rate that averages about 5 centimeters per year—about as fast as your fingernails grow. This movement is driven by the unequal distribution of heat within Earth. Hot material found deep in the mantle moves slowly upward as part of Earth’s internal convection system. At the same time, cooler, denser slabs of oceanic lithosphere descend into the mantle, setting Earth’s rigid outer shell into motion. The grinding movements of Earth’s lithospheric plates generate earthquakes, create volcanoes, and deform large masses of rock into mountains.

**Types of Plate Boundaries**

All major interactions among individual plates occur along their boundaries. **The three main types of boundaries are convergent, divergent, and transform fault boundaries.**

**Divergent boundaries**

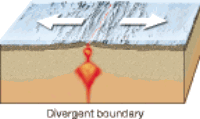
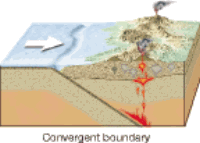
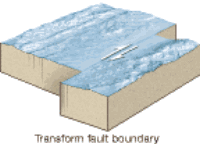
[**Divergent boundaries**](javascript:openGlossaryWnd('e_ga_06_divrgntbound')) (also called spreading centers) occur when two plates move apart. This process results in upwelling of material from the mantle to create new seafloor, as shown in Figure 7A. A relatively new divergent boundary is located in Africa, in a region known as the East African Rift valley.

**Convergent boundaries**

[**Convergent boundaries**](javascript:openGlossaryWnd('e_ga_06_convergbndry')) form where two plates move together. This process results in oceanic lithosphere plunging beneath an overriding plate, and descending into the mantle, as shown in Figure 7B. At other locations, plates carrying continental crust are presently moving toward each other. Eventually, these continents may collide and merge. Thus, the boundary that once separated two plates disappears as the plates become one.

**Transform fault boundaries**

[**Transform fault boundaries**](javascript:openGlossaryWnd('e_ga_06_transfrmftbdy')) are margins where two plates grind past each other without the production or destruction of lithosphere, as shown in Figure 7C. The San Andreas Fault zone in California is an example of a transform fault boundary.



**Figure 7 Three Types of Plate Boundaries**

Each plate contains a combination of these three types of boundaries. Although the total surface area of Earth does not change, plates may shrink or grow in area. This shrinking or growing depends on the locations of convergent and divergent boundaries. The Antarctic plate is growing larger. The Philippine plate is descending into the mantle along its margins and is becoming smaller. New plate boundaries can be created because of changes in the forces acting on these rigid slabs.

**Chapter 9 Section 2 Plate Tectonics Assessment Questions**

**Reviewing Concepts**

(1)Define the term *lithospheric plate*

(2)List the three types of plate boundaries.

(3)What theory proposes that Earth’s outer shell consist of a number of rigid

slabs?

**Critical Thinking**

(4) **Comparing And Contrasting** Compare the plate motions in the three

types of boundaries.

(5) **Drawing Conclusions** What is the major difference in the role of the

ocean floor between the continental drift hypothesis and the theory of

plate tectonics?

**Chapter 9 Section 2 Plate Tectonics Assessment Questions**

**Reviewing Concepts**

(1)Define the term *lithospheric plate*

(2)List the three types of plate boundaries.

(3)What theory proposes that Earth’s outer shell consist of a number of rigid

slabs?

**Critical Thinking**

(4) **Comparing And Contrasting** Compare the plate motions in the three

types of boundaries.

(5) **Drawing Conclusions** What is the major difference in the role of the

ocean floor between the continental drift hypothesis and the theory of

plate tectonics?